RC4*Magic*
Series 2 R3

Wireless DMX and
Wireless Dimming System

DMXioR3

DMX4dim-500

DMX4dim

DMX2dimR3

User Manual

RC4 Wireless

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Disclaimers

WIRING AND INSTALLATION OF BATTERIES, DIMMERS, AND LOADS MUST BE IN ACCORDANCE WITH APPLICABLE LOCAL AND NATIONAL ELECTRICAL CODES.
RC4 Wireless devices and equipment are operated at the user's own risk and RC4 Wireless accepts no liability, either direct or consequential, as a result of using this equipment.

Not for Use Where Human Safety May Be At Risk

RC4 Wireless accepts no liability for direct, indirect, or consequential damages resulting from the use of any RC4 Wireless product or group of products. RC4 Wireless does not guarantee the suitability of any product for any purpose; user assumes all risk. RC4 dimmers must be used strictly in accordance with manufacturer's instructions and cannot be used for unsupervised operation. RC4 Wireless products must be installed and operated only by qualified technicians, as outlined in the manufacturer's documentation, and should be inspected and tested on a regular basis to ensure proper and safe operation.

Not for Control of Pyrotechnical Devices

RC4 Wireless products should not be used to control pyrotechnics of any kind. A brief output surge on dimmer outputs during power-up could trigger these devices. RC4 Wireless accepts no liability if RC4 equipment is used for this or any other purpose.

Product Safety

RC4 receiver/dimmers are capable of controlling very large currents at up to 30VDC (typically 12V). Dimmers should not be allowed to operate at dangerous temperatures. Appropriately sized wire and connectors must be used, along with suitable ventilation and external fuses rated for the load being operated. Additional information is provided in this manual, but this manual is not intended to be a comprehensive electrical safety guide,

Statements of RF Conformity

United States (FCC)

RC4Magic Series 2 devices contain XBeePro radios, **FCC ID OUR-XBEEPRO**, and comply with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (*i.*) these devices may not cause harmful interference and (*ii.*) these devices must accept any interference received, including interference that may cause undesired operation.

Canada (IC)

RC4Magic Series 2 devices contain XBeePro radios, **IC: 4214A-XBEEPRO**.

Japan

RC4Magic Series 2 devices contain XBeePro radios, **ID: 005NYCA0378**.

Europe (ETSI)

XBeePro radios used in RC4Magic Series 2 devices have been certified for use in most European countries. Norway prohibits operation near Ny-Alesund in Svalbard. Other restrictions may apply. For additional information, please contact RC4 Wireless.

Other Countries and Jurisdictions

XBeePro radios used in RC4Magic Series 2 devices have also been issued Declarations of RF Conformity for Australia/New Zealand, and Korea. For additional information, please contact RC4 Wireless.

RC4*Magic Quick Start – It's Easy!*

RC4Magic Series 2 is truly Plug-n-Play – you can start using it right away.

DMX Transmitter

If your system has just one DMXio module, it will be factory configured as a transmitter.

If you have multiple DMXio modules, only one is configured as a transmitter, the rest are configured as receivers. A temporary label has been provided to identify the transmitter.

Connect a supplied wall-transformer power supply to your DMXio transmitter. Plug in a DMX data source and see that the **dmx/RFc** led comes on. That's it – you're on the air.

DMX Receiver

Connect a supplied wall-transformer power supply to a DMXio receiver. It can take anywhere from 3 to 15 seconds for the receiver to connect with the transmitter. When the RF data led starts blinking and shimmering, you have DMX data coming out. You now have a 200+ foot wireless DMX link.

Identifying Transmitters and Receivers

If you've lost track of which DMXio is your transmitter, watch the leds during power-up. An led chase from left to right – "signal going out" – indicates a transmitter. A chase from right to left – "signal coming in" – indicates a receiver.

Wireless Dimming

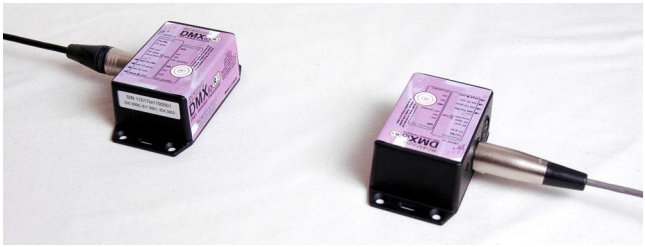
DMX2dim, DMX4dim, and DMX4dim-500 receiver-dimmers are complete standalone devices. New DMX2dim units are pre-assigned to DMX channels 1 and 2 with a linear dimming curve. DMX4dim units (both sizes) are pre-assigned to DMX channels 1, 2, 3, and 4 with a linear dimming curve. (It's easy to change channel and curve assignments, as described later in this manual.)

Using a small screwdriver, connect a power supply (usually a 12V battery) to the +/-DC IN screw terminals. Connect a load (usually an MR16 or MR11 12V lamp) to the DimA+/- terminals. After power-up, it can take anywhere from 3 to 15 seconds for the receiver to connect with the transmitter.

Fade DMX channel 1 up and down on the DMX controller connected to your DMXio transmitter. See your lamp dim up and down. You now have a wireless DMX-controlled lamp.

Now it's time to read through this manual to learn how to set dimmer channels, change system IDs, interpret the leds, and more. Thank you for choosing RC4Magic Series 2!

RC4*Magic – An Overview*



DMX Cable Replacement / DMX Distribution

The heart of RC4Magic Series 2 (RC4M-S2) is the DMXio module. (This manual refers specifically to the DMXioR3, which provides several features not previously available.)

A DMXio can act as a wireless transmitter or receiver, and any number of receivers can be used in a system. A pair of DMXio units configured as transmitter and receiver replaces a standard DMX cable. RC4Magic modules work reliably to distances beyond 200 feet within most theatres and performance spaces.

Any number of receivers can be used in an RC4Magic system, taking the place of splitters and distribution boxes, providing superior electrical isolation along with uncluttered convenience.

Configured as a transmitter, the DMXio encodes and encrypts the incoming DMX universe, and broadcasts it using Direct Sequence Spread Spectrum (DSSS) digital radio. Unlike wired DMX, the broadcast signal includes error checking and correction codes, and is not affected by minor interruptions and interference. Incoming DMX channels are broadcast with appropriate speed, redundancy and accuracy; additional bandwidth is dynamically allocated to channels that are changing. This allows RC4Magic to use less radio bandwidth than competing systems while still delivering excellent DMX data performance.

As a receiver, the DMXio decodes the rf signal from the associated transmitter, rebuilds the DMX universe, and generates a DMX signal with the same channels and packet timing as the original input. DMX in and out are compliant with the USITT DMX512/1990 standard.

RC4Magic Series 2 does not transmit DMX messages with start codes other than zero. Thus, it can only be used for dimmer data. It will not work with non-zero packets carrying proprietary data or RDM packets.

Wireless Low-Voltage Dimming

The DMX2dim, DMX4dim, and DMX4dim-500 receiver-dimmers decode the rf signal from the DMXio transmitter and send user-selected DMX channel levels to built-in low-voltage dimmers. In addition to DMX channel, each dimmer can be assigned a linear, inverse square-law (ISL), or non-dim power curve.

Any number and combination of RC4Magic Series 2 receiver-dimmers can be used in a system.

System ID Numbers: Ultimate Data Security

A system ID is a unique code, similar to a password or encryption key. When multiple RC4Magic Series 2 devices are configured with the same ID, they form a Private Area Network (PAN). Other devices on other IDs can form their own PANs, and up to 15 independent PANs can operate in the same physical space (defined by the range of the rf signal, typically 200 to 300 feet).

Every RC4Magic user is assigned 3 unique private system ID codes (more than 3, if needed). No other user in the world has the same unique codes you have. RC4Magic ID codes are managed by RC4 Wireless, and authorized representatives, through a worldwide online database system.

No other wireless DMX system in the world – at any cost – provides this level of data security.

Each of your RC4Magic Series 2 devices is programmed with 3 unique private ID codes that belong to you, plus a public ID (PAN ID 999). Your IDs are labelled on the outside of each unit, along with the device serial number.

When ordering additional devices for an existing RC4Magic Series 2 system, you specify the ID numbers to be installed, which can be any combination of IDs previously assigned to you, and/or new IDs. To ensure the reliability and security of all RC4Magic Series 2 systems for all users, every new system for a new user is assigned its own set of new private IDs.

In the rare case where multiple RC4 Magic Series 2 users need to share or pool their equipment, the common public ID can be used.

Power-Up Sequence and Radio Channel Assignments

When an RC4Magic Series 2 DMXio transmitter first powers up, it scans the 2.4Ghz radio band, which is quite large and supports many radio channels, looking for an area with the least traffic and lowest pre-existing rf power levels. It then sets itself to operate on that frequency and begins transmitting DMX packets encoded with a specific system ID number. When this power-up process is complete, the **RF data** led blinks rapidly or shimmers indicating data being sent.

When a DMXio receiver or DMX2dim/4dim receiver-dimmer powers up, it scans the 2.4GHz band looking for signals from a DMXio transmitter on the selected ID number. When the PAN connection is established, the **RF Con** (on a receiver-dimmer) or **dmx/RFc** (on a DMXioR3) led will blink steadily. When DMX channel data starts flowing, the **RF data** led will blink and shimmer.

If a receiver does not receive valid data for 10 seconds, the start-up scan procedure repeats. Thus, if the transmitter has been turned off and back on (or there has been a power failure) and it selects a different frequency range to transmit in, the receiver will rescan and reconnect. Thus, receivers always follow transmitters on the same System ID.

Multiple RC4Magic Series 2 systems using different IDs can operate at the same time in the same space, and each system will provide a separate wireless DMX universe. In a space with little or no other radio activity, there is enough bandwidth in the 2.4GHz band to support up to 15 RC4Magic Series 2 systems, each with any number of receivers and dimmers. Even in crowded rf environments there will usually be enough bandwidth for 3 or more separate RC4Magic systems.

> ***One wireless DMX universe with up to 512 channels uses one RC4Magic system ID. A DMXio transmitter on a separate ID is required for each different DMX universe you broadcast. Thus, 3 System IDs provide 3 individual wireless universes, provided you have enough RC4Magic hardware to make use of them. You can add RC4Magic devices to your system at any time – just tell us your System IDs when you order.***

Advanced Settings

The DMxioR3 transceiver provides several advanced features that are selected by pushing recessed pushbuttons with a bent paperclip or other slim tool. Few users do anything beyond selecting between Tx (transmitter mode) and Rx (receiver mode). Available settings include:

Tx / Rx Mode. Select whether a DMXio is transmitting DMX data arriving on a cable (Tx), or receiving rf data and outputting DMX on a cable (Rx).

Channel Groups. Normally, the DMXioR3 transmits the complete incoming DMX universe, up to 512 channels. You can limit transmission to the first 128, 256, or 384 DMX channels coming in. This increases the rf bandwidth allocated to the selected group, increasing data fidelity and demanding less of RC4Magic data compression.

RF Power. DMXio transmitters shipped within North America are preset to transmit 100 mW (18 dBm) of RF power. Units shipped to Europe, Japan, and jurisdictions with similar regulations, are preset to transmit 10mW (10dBm). Only the lowest power level is permitted in most locations outside North America. Within North America, a total of four user-selectable power levels are available.

ID Select. By default, all RC4Magic Series 2 devices are set to their first unique System ID, identified as ID0 (ID zero). Any of 3 unique IDs or the common public ID (ID3) can be selected (except on the DMX2dim, which cannot select ID2). The actual alphanumeric values for ID0, ID1, and ID2 are labeled on each RC4Magic Series 2 device. (Only ID3 is the same for every unit sold; that code, the Public ID, is 999.)

Additional information about device configuration is provided later in this manual.

DMXio R3 User Interface

The DMXio R3 provides five led indicators and four recessed pushbuttons for access to all settings.

These leds and buttons – the user interface, or UI – have one set of functions during normal Running mode, and other functions that occur only during Power Up.

LEDs at Power Up

During power up the five leds chase, blink, and chase again. The direction of the chase indicates Tx (transmit) or Rx (receive) mode. The blinking between the two chases indicates which System ID is currently selected.

For example, leds on a transmitter set to System ID0 (ID zero) will chase left to right, briefly blink the red **Ch grps** led, then chase left to right again. The unit then proceeds to Running mode.

Blink chase direction is as viewed with mounting flanges down and connectors, leds, and buttons facing you.

DMXioR3 led indicators use blink patterns to indicate various settings.

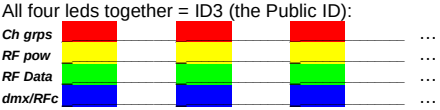
Between power-up chase patterns, the System ID indicators are:

Red **Ch grps** = ID0:

Yel **RF pow** = ID1:

Green **RF data** = ID2:

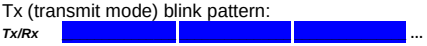
All four leds together = ID3 (the Public ID):



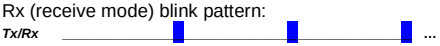
LEDs in Running Mode

The blue *Tx/Rx* indicator is closest to the DC power inlet. In Tx mode, it is ON with a short blip off approximately once per second. In Rx mode, it is OFF with a short blip on approximately once per second. The short blips serves as a Computer-Operating-Properly (COP) indicator. The presence of these blips tells us that the microprocessor is running, even if no other leds are currently on.

Tx (transmit mode) blink pattern:

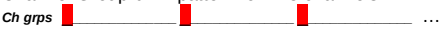


Rx (receive mode) blink pattern:



The red *Ch grps* led indicates how many DMX channels are being broadcast in Tx mode. Normally, this led is solidly on, not blinking, to indicate that all incoming channels are being transmitted exactly as they arrive at the DMX input. Limited groups of channels are indicated by blink patterns:

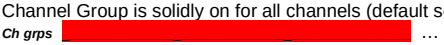
Channel Group blink pattern for 128 channels:



Channel Group blink pattern for 256 channels:

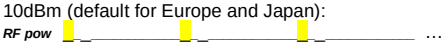
Channel Group blink pattern for 384 channels:

Channel Group is solidly on for all channels (default setting):



The yellow RF pow indicator shows transmitter output power in Tx mode, or received signal strength in Rx mode. In Tx mode, power level blink patterns are:

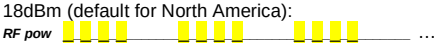
10dBm (default for Europe and Japan):



14dBm:

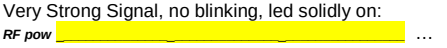
16dBm:

18dBm (default for North America):



In Rx mode, receive signal strength indication (RSSI) blink patterns range from:

Very Strong Signal, no blinking, led solidly on:

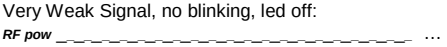


Strong Signal, continuous blinking:

(fewer and fewer blinks) …

Weak Signal, single blinks:

Very Weak Signal, no blinking, led off:

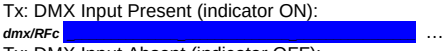


The green RF Data led blinks with each data packet, either transmitted or received. When no DMX channels are changing, this can appear as a very rapid blink. Changing DMX levels will cause this led to shimmer or even appear solidly on because there are many data packets very close together:

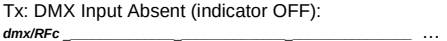
The blue dmx/RFc led indicates the presence of incoming DMX data (**dmx**) in Tx mode, or connection with an associated transmitter (**RFc**) in Rx mode.

In Tx mode, this indicator is solidly on when DMX data is present. It will go off after one second if DMX data is no longer present:

Tx: DMX Input Present (indicator ON):



Tx: DMX Input Absent (indicator OFF):



In Rx mode, this indicator is off when there is no active PAN connection to a transmitter. When the unit has successfully connected to a DMXio transmitter with the correct System ID number, this indicator will continuously blink at moderate speed:

Rx: No Transmitter Found (indicator OFF):

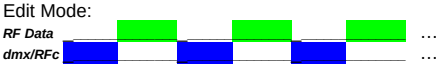
Rx: Transmitter Found and Connected:

LEDs in Edit Mode

When recessed buttons are used to change settings in Running mode, the unit temporarily enters Edit Mode. When desired settings are correctly indicated on the leds, these new settings are saved to non-volatile Flash memory by pressing the **save & run** button (further details are provided later in this manual).

While in Edit Mode, the **Tx/Rx**, **Ch grps**, and **RF pwr** indicators work as described above. The remaining two leds, **RF data** and **dmx/RFc**, toggle back and forth to indicate that settings are in the process of being altered and have not yet been saved:

Edit Mode:



When the **save & run** button is pressed, new settings are stored in Flash memory, the leds do a quick back-and-forth chase, and the unit restarts with a full Power Up sequence.

Recessed Buttons

The four DMXioR3 buttons are recessed behind small holes in the case, to the right of the led indicators, directly above the female DMX connector. They are hidden to avoid unwanted changes to settings, which most users never need to adjust. To operate these buttons, use a bent paperclip or other slim tool:

DMXio buttons are very small and are not intended for rough handling. Press them gently. You will feel a slight click or gentle pop as they depress.

Do not poke anything into the led openings. Doing so may damage the leds and other circuitry. Such damage is NOT covered under warranty.

Buttons at Power Up

During Power Up, each recessed button selects a System ID:

Set Tx/Rx selects ID0
Set Ch grps select ID1
Set RF pwr selects ID2
save & run selects ID3 (Public ID)

Press and hold the desired button, then apply power. As soon as the Power Up led sequence appears, release the button. *Continuing to hold the button after Power Up will invoke that button's Running function.*

The new system ID is immediately saved in non-volatile Flash memory. During Power Up, the led sequence will indicate the selected ID as described above in *LEDs at Power Up*.

Buttons in Running Mode

In Running mode, buttons should be tapped, rather than held – that is, they should be quickly pressed and released. Tapping any of the three Set buttons will invoke Edit Mode, which is indicated by toggling leds as described on the previous page.

> **While in Edit Mode the unit is not a functioning transmitter or receiver.**
> **You must exit Edit Mode to resume normal Running operation.**

The **Tx/Rx**, **Ch grps**, and **RF pwr** leds indicate settings being selected by the buttons.

Each tap of the **Set Tx/Rx** button will toggle the mode, changing the blink pattern of the **Tx/Rx** led. Tap it until the desired mode is indicated.

Each tap of the **Set Ch grps** button will increment through the available channel group settings. Repeatedly tap the button until the **Ch grps** led indicates the desired setting. When the **Ch grps** led is continuously on (not blinking) all incoming DMX channels are transmitted. This is the default and most commonly used setting.

Each tap of the **Set RF pwr** button will increment through the available rf power settings. Repeatedly tap the button until the **RF pwr** led indicates the desired setting.

When the **Tx/Rx**, **Ch grps**, and **RF pwr** led all indicate the desired settings, tap the **save & run** button. This saves the new settings to non-volatile Flash memory and restarts the unit. You will see the Power Up led sequence, followed by normal Running mode with the selected settings.

DMXioR3 Transmitter Setup

Only one DMXio should be operated in transmitter mode on each system ID. Multiple transmitters on the same ID will produce undesirable and unpredictable results if they are within 300 feet of each other.

Mode Selection and Connections

To use an RC4Magic DMXioR3 as a transmitter, it must be in Tx mode. This mode is indicated at Power Up by leds chasing left to right. After power up, Tx mode is indicated by the **Tx/Rx** led being predominantly on, with short blips off approximately once per second. (The short blips are a Computer Operating Properly – COP – indication.)

With power and DMX data connected, the DMXioR3 in Tx mode will begin transmitting.

The DMX input is compliant with USITT DMX512/1990(4us), with no internal termination. If you are putting the DMXio at the end of a long DMX cable, a terminator plug should be inserted in the DMX output jack or inline at the input jack. For short cable runs, termination is often (but not always) unnecessary.

Power should be 6 – 18VDC (normally 9 – 12V) and can come from the power supply provided (wall transformer) or batteries. A small pack of 6 AA or AAA batteries, or a 9V or 12V battery, can be used for portable operation with, for example, a battery powered DMXter, Pocket Console DMX, or other mobile DMX signal source. The power inlet is a standard 2.1mm receptacle, center-positive.

The DMX output jack is ideal for inserting the DMXio in a wired DMX network. With a short DMX cable, the DMXio can be positioned at the output of your lighting console or other controller, before your DMX signal continues to other devices in your system. Internally, the DMX input connects directly to the DMX output, so the data will always pass through, even if the DMXio is not powered.

Once everything is connected, position the red circle RF Hotspots on all RC4Magic devices so they are all facing upward. If this is difficult, face the RF Hotspots towards any common reflective surface, like a wall, ceiling, or open floor area.

Line-of-sight is NOT required for RC4Magic, but dense objects between units – like concrete walls – will attenuate the radio signal and reduce the available range.

Most DMX controllers output a full universe of 512 channels. Some controllers output a smaller universe of 128, 256, or other number channels. The maximum packet rate for 512 channels is 44 packets per second. Many controllers output fewer than 44 packets per second; 30 packets per second is somewhat common.

With all channel groups enabled (the **Ch grp** led indicator solidly on, not blinking) the DMXio transmits all DMX channels that are coming in. Associated DMXio receivers will output the same number of channels and packet rate as is arriving at the transmitter.

You can change the Channel Group setting so that the DMXioR3 transmits 128, 256, or 384 channels, regardless of how many channels are arriving at the DMX input jack. This is useful if you do not require the full universe over a wireless link. Fewer channels reduces rf bandwidth, and increases data fidelity.

DMXio Receiver Setup

Any number of DMXio units in receiver mode can be used in an RC4Magic Series 2 system.

Mode Selection and Connections

To use an RC4Magic DMXioR3 as a receiver, it must be in Rx mode. This mode is indicated at Power Up by leds chasing right to left. After power up, Tx mode is indicated by the **Tx/Rx** led being predominantly off, with short blips on approximately once per second. (The short blips are a Computer Operating Properly – COP – indication.)

Connect the supplied power adaptor, and connect the DMX output to your DMX devices. It can sometimes take 10 seconds or more for a DMXio receiver to find and connect to a transmitter and begin outputting DMX data, but it will often connect much faster.

DMX output is compliant with USITT DMX512/1990, and closely mimics the data going into the associated DMXio transmitter.

With all channel groups enabled (the **Ch grp** led indicator is solidly on, not blinking, on the associated transmitter) the DMXioR3 receiver will output the same number of channels and packets per second that are arriving at the transmitter input. DMX packets can contain anywhere from 1 to 512 channels, with a frame rate of anywhere from 12 packets to thousands of packets per second. (Of course, high frame rates require fewer channels in each packet.)

If you are putting the DMXio receiver at the beginning of a long DMX cable run, a terminator should be used at the far end. For short cable runs, termination is often (but not always) unnecessary.

> ***Remember: The DMXio receiver is a DMX data source and acts as a controller – just like the DMX output on your console or DMX controller.***

Power should be 6V – 18VDC and can come from the power supply provided (wall transformer) or batteries. A small pack of 6 AA or AAA batteries, or a 9V or 12V battery, can be used for portable operation. The power inlet is a standard 2.1mm receptacle, center-positive.

Once everything is connected, position the red circle RF Hotspots on all RC4Magic devices so they are all facing upward. If this is difficult, face the RF Hotspots towards any common reflective surface, like a wall, ceiling, or open floor area.

Line-of-sight is NOT required for RC4Magic, but dense objects between units – like concrete walls – will attenuate the radio signal and reduce the available range.

DMX2dimR3 Receiver-Dimmer Setup

The DMX2dim is a completely standalone unit that includes a built-in RC4Magic Series 2 radio receiver and 2 low-voltage pulse-width-modulation dimmers.

Any number of DMX2dim receiver-dimmers can be used in an RC4Magic Series 2 system.

The radio operates identically to the DMXio in receiver mode. Line-of-sight is NOT required for RC4Magic, but dense objects between RC4Magic units – like concrete walls – will attenuate the radio signal and reduce the available range. It can take 10 seconds or more for the DMX2dim to connect to the associated DMXio transmitter and begin powering the dimmer outputs, but it will often connect much faster.

Connections

Small screw terminals are provided for connection of the power supply (+/-DC IN) and load devices (+/-DimA and +/-DimB). **The power supply operates both the internal electronics and the connected loads and must be powerful enough to run the load without significant voltage drop.** The dimmers use high-frequency pulse-width-modulation, switching on the negative side of the circuit.

The most typical power supply is a 12V rechargeable sealed lead-acid (SLA) battery, sometimes called a “gel cell”. **The maximum voltage for the DMX2dimR3 is 24V (12V nominal).** An internal self-resetting circuit breaker protects the microcontroller, radio, and dimmer electronics. The internal circuitry of the DMX2dim requires a minimum of 5V to operate efficiently. It will run at voltages as low as 3.5V, but this is not recommended because the dimmer power drivers may overheat.

Once everything is connected, position the red circle RF Hotspots on all RC4Magic devices so they are all facing upward. If this is difficult, face the RF Hotspots towards any common reflective surface, like a wall, ceiling, or open floor area.

WIRING AND INSTALLATION OF BATTERIES, DIMMERS, AND LOADS MUST BE IN ACCORDANCE WITH APPLICABLE LOCAL AND NATIONAL ELECTRICAL CODES. Low voltage circuitry CAN be dangerous. RC4 Wireless devices and equipment are operated at the user’s own risk and RC4 Wireless accepts no liability, either direct or consequential, as a result of using this equipment.

Selecting System IDs

Each RC4Magic Series 2 DMX2dim has 3 system IDs programmed internally. IDs are selected by holding down a recessed pushbutton during power-up.

Note: Although the associated DMXio transmitter can be set to any of 4 available IDs, only 3 are available on the DMX2dim. When using DMX2dim dimmers, do not use ID2 on the DMXio transmitter.

To select ID0, hold down the SetA/ID0 button while powering on the DMX2dim unit. The RSSI led will blink 10 times rapidly to confirm the setting. Immediately release the button when the blink confirmation appears.

To select ID1, hold down the SetB/ID1 button while powering on the unit. The middle Data led will blink 10 times rapidly to confirm the setting. Immediately release the button when the blink confirmation appears.

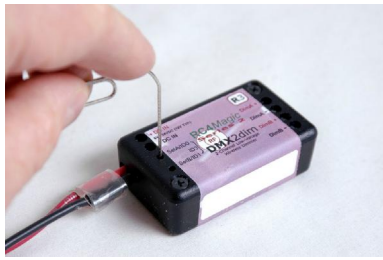
To select ID3 (the public ID), hold down both buttons together while powering on. The three left-most leds (RSSI, Data, and RF Con) will blink together 10 times rapidly to confirm the setting. Immediately release the buttons when the blink confirmation appears.

> ***Note: Failure to release buttons before the blinking confirmation completes could invoke other features and functions. Due to the small size of the DMX2dim dimmer, various functions and operations have been multiplexed onto these two buttons.***

The ID setting is stored in non-volatile eeprom memory and will be used for all subsequent operations until the ID is changed using this same procedure.

Assigning DMX Channels to DMX2dim Dimmers

Assigning DMX channels and dimmer curves is easy. The process requires a powered and functioning DMXio in transmitter mode, a DMX data source, and the DMX2dim dimmer. It is easiest if you set everything up together, near your DMX console. If you are not using a console, useful alternatives include a DMXter, a Pocket Console DMX, or any similar DMX tester or controller capable of outputting a DMX level on one specific channel.



Follow these simple steps:

1. Apply power to your DMXio transmitter and DMX2dim dimmer. Wait for the scanning and connection process to complete. The **RF Con** indicator on the receiver should be blinking.

2. At your DMX source, set all DMX channels to zero. Ensure that special channels (like house lights) are also at zero – it is important that all DMX channels are off.

   The most common causes of problems are house lights or work lights on a low DMX channel, or moving-light profile channels going to non-zero values when the console is cleared. All DMX channels must be off – actually zero.

3. Bring up the level of a single channel you wish to assign to a DMX2dim dimmer. This is the channel you will be assigning to the dimmer. The level you use determines the dimmer curve that will be assigned:

Non-dim:	100% (80% or higher)
Linear dimming:	70% (anywhere from 60% to 79%)
Inverse-square-law (ISL) fast:	50% (40% to 59%)
Inverse-square-law (ISL) slow:	30% (20% to 39%)

4. On the DMX2dim, use the end of a bent paper clip or other small tool to press and hold the SetA or SetB recessed button for one second, or until the corresponding dimmer led comes on. The selected dimmer will be assigned to the lowest non-zero DMX channel currently being broadcast from the associated DMXio transmitter.

DMX channels at a level below 12% are ignored by the dimmer channel assignment process.

See the ***Dimmer Curves and Output Resolution*** section of this manual for more information about curves, slow and fast ISL response, etc.

Channel and dimmer curve assignments are stored in non-volatile eeprom memory and will remain until you change them using this same procedure.

LED Indicators

The DMX2dim has five leds – three logic indicators on the short side with the power input connections, and two output indicators on the short side with the dimmer connections.

On the dimmer output end:

The **DimA** and **DimB** leds are directly connected to dimmer outputs. They appear to dim more smoothly and linearly when using the inverse-square-law dimming curve. This is because leds have a square-law response.

On the power input end:

The **RSSI** led provides Receiver Signal Strength Indication by blinking faster when the rf signal is stronger. With the strongest signal, it appears to be almost solidly on with a slight shimmer. With no signal at all, it blinks slowly. *In normal operation, this led should be blinking quickly or flickering.*

The **Data** indicator is on while a data packet is received by radio. *In normal operation this LED appears to blink rapidly, and will shimmer or flicker while DMX levels are changing.*

The **RF Con** indicator will light continuously after power-up, while radio channels are being scanned. When valid data from an associated DMXio transmitter is found, this indicator will blink steadily. *In normal operation, this led should be blinking.*

DMX4dim Receiver-Dimmer Setup

The DMX4dim is a completely standalone unit that includes a built-in RC4Magic Series 2 radio receiver and 4 low-voltage pulse-width-modulation dimmers.

Any number of DMX4dim receiver-dimmers can be used in an RC4Magic Series 2 system.

The radio operates identically to the DMXio in receiver mode. Line-of-sight is NOT required for RC4Magic, but dense objects between RC4Magic units – like concrete walls – will attenuate the radio signal and reduce the available range. It can take 10 seconds or more for the DMX4dim to connect to the DMXio transmitter and begin powering the dimmer outputs, but it will often connect much faster.

Connections

Small screw terminals are provided for connection of the power supply (+/-DC IN) and load devices (+/-DimA, +/-DimB, +/-DimC, +/-DimD). **The power supply operates both the internal electronics and the connected loads and must be powerful enough to run the load without significant voltage drop.** The dimmers use high-frequency pulse-width-modulation, switching on the negative side of the circuit.

The most typical power supply is a 12V rechargeable sealed lead-acid (SLA) battery, sometimes called a "gel cell". **The maximum voltage for the DMX4dim is 18V (12V nominal).** An internal self-resetting circuit breaker protects the microcontroller, radio, and dimmer electronics. A user-accessible blade-type automotive fuse (Bussmann ATC series) protects the connected wiring and loads and is in the positive side of the circuit. **The maximum fuse size is 15A (ATC-15) and should be the fast-blow type. Always use the smallest possible fuse value for the connected load, and be sure the wire gauge you are using is suitable for the fuse rating chosen.**

The internal circuitry of the DMX4dim requires a minimum of 5V to operate efficiently. It will run at voltages as low as 3.5V, but this is not recommended because the dimmer circuitry may overheat.

Once everything is connected, position the red circle RF Hotspots on all RC4Magic devices so they are all facing upward. If this is difficult, face the RF Hotspots towards any common reflective surface, like a wall, ceiling, or open floor area.

> ***WIRING AND INSTALLATION OF BATTERIES, DIMMERS, AND LOADS MUST BE IN ACCORDANCE WITH APPLICABLE LOCAL AND NATIONAL ELECTRICAL CODES. Low voltage circuitry CAN be dangerous. RC4 Wireless devices and equipment are operated at the user's own risk and RC4 Wireless accepts no liability, either direct or consequential, as a result of using this equipment.***

Selecting System IDs

Each RC4Magic Series 2 DMX4dim has 4 system IDs programmed internally. IDs are selected by holding down a recessed pushbutton during power-up.

To select ID0, hold down the SetA/ID0 button while powering on the DMX2dim unit. The left-most RSSI led will blink 10 times rapidly to confirm the setting. Immediately release the button when the blink confirmation appears.

To select ID1, hold down the SetB/ID1 button while powering on the unit. The middle Data led will blink 10 times rapidly to confirm the setting. Immediately release the button when the blink confirmation appears.

To select ID2, hold down the SetC/ID2 button while powering on the unit. The right RF Con led will blink 10 times rapidly to confirm the setting. Immediately release the button when the blink confirmation appears.

To select the public ID (ID3), hold down the SetD/ID3 button while powering on the unit. The three left-most leds (RSSI, Data, and RF Con) will blink together 10 times rapidly to confirm the setting. Immediately release the button when the blink confirmation appears.

The ID setting is stored in non-volatile eeprom memory and will be used for all subsequent operations until the ID is changed using this same procedure.

Assigning DMX Channels to DMX4dim Dimmers

Assigning DMX channels and dimmer curves is easy. The process requires a powered and functioning DMXio in transmitter mode, a DMX data source, and the DMX4dim dimmer. It is easiest if you set everything up together, near your DMX console. If you are not using a console, useful alternatives include a DMXter, a Pocket Console DMX, or any similar DMX tester or controller capable of outputting a DMX level on a specific channel.

Follow these simple steps:

1. Apply power to your DMXio transmitter and DMX4dim dimmer. Wait for the scanning and connection process to complete. The RF Con indicator on the receiver should be blinking.

2. At your DMX source, set all DMX channels to zero. Ensure that special channels (like house lights) are also at zero – it is important that all channels are off.

   The most common causes of problems are house lights or work lights on a low DMX channel, or moving-light profile channels going to non-zero values when the console is cleared. All DMX channels must be off – actually zero.

3. Bring up the level of a single channel you wish to assign to a DMX4dim dimmer. This is the channel you will be assigning to the dimmer. The level you use determines the dimmer curve that will be assigned:

Non-dim:	100% (80% or higher)
Linear dimming:	70% (anywhere from 60% to 79%)
Inverse-square-law (ISL) fast:	50% (40% to 59%)
Inverse-square-law (ISL) slow:	30% (20% to 39%)

4. On the DMX4dim, use the end of a bent paper clip or other small tool to press and hold the SetA, SetB, SetC, or SetD recessed button for one second, or until the corresponding dimmer led comes on. The selected dimmer will be assigned to the lowest non-zero DMX channel currently being broadcast from the associated DMXio transmitter.

Channels below 12% are ignored by the channel assignment process.

See the ***Dimmer Curves and Output Resolution*** section of this manual for more information about curves, slow and fast ISL response, etc.

Channel and dimmer curve assignments are stored in non-volatile eeprom memory and will remain until you change them using this same procedure.

LED Indicators

Seven LED indicators on the narrow front side of the DMX4dim assist with troubleshooting.

The left-most **DimA/B/C/D** indicators are directly connected to the dimmer outputs, after the power fuse. Thus, a blown fuse will disable these indicators. They appear to dim more smoothly and linearly when using the inverse-square-law dimming curve – this is because leds have a square-law response.

The **RSSI** led provides Receiver Signal Strength Indication by blinking faster when the rf signal is stronger. With the strongest signal, it appears to be almost solidly on with a slight shimmer. With no signal at all, it blinks with the same pattern as a DMXio transmitter. *In normal operation, this led should be blinking or flickering.*

The **Data** indicator is on while a data packet is received by radio. *In normal operation this LED appears to blink rapidly, and will shimmer or flicker while DMX levels are changing.*

The **RF Con** indicator will light continuously after power-up, while radio channels are being scanned. When valid data from an associated DMXio transmitter is found, this indicator will blink at double the speed of the RF Active LED on the transmitter. *In normal operation, this led should be blinking.*

DMX4dim-500 High Power Receiver-Dimmer Setup

The DMX4dim-500 is functionally identical to the DMX4dim, but in a larger package with higher power handling. Buttons and led labels and functions are the same, but are all located on the top surface.

Refer to the previous section about the DMX4dim for specific instructions on setting DMX channels and dimmer curves.

The DMX4dim-500 uses an internal switching power supply for maximum power efficiency and an extended voltage range. This is the only RC4Magic Series 2 device that will run efficiently with an input voltage as high as 30VDC.

Each dimmer output on the DMX4dim-500 can handle a 125W load, for a total power handling of 500W.

At 12 Volts, 500 Watts is 42 Amps! Handling 42A requires special precautions, starting with high-current Anderson connections for power input. Anderson shell and pin part numbers are provided in a separate document. When running at maximum capacity, you must use 45A Anderson pins for input power. These pins are LARGE for a reason: passing 42A requires a large wire gauge (thick and heavy).

IF WIRES ARE HOT, THE WIRE GAUGE IS TOO THIN.

Use a crimping tool intended for Anderson pins, or solder the wires to the pins. An appropriate crimping tool can commonly be found online for less than $60. Soldering a large wire to a large pin requires a high wattage soldering iron. Cold solder joints will not do the job.

IF CONNECTORS AND/OR PINS ARE RUNNING HOT, THE CONNECTIONS ARE INADEQUATE OR THE WRONG PIN SIZE HAS BEEN USED.

DMX4dim-500 dimmer components will get warm when driving 125W. A cooling fan keeps air passing over the drivers to prevent thermal shutdown. In the event that the fan fails or the ventilation path is blocked, the drivers will overheat and turn themselves off.

IF DIMMERS ARE TURNING OFF BY THEMSELVES, THEY ARE PROBABLY OVERHEATING AND THERMALLY SHUTTING DOWN TO PROTECT THEMSELVES FROM FAILURE. In this case, you have either overloaded the dimmer outputs, or ventilation is inadequate.

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Dimmer Resolution and Curves

Dimmer Resolution

All RC4Magic Series2 dimmers provide 14-bit digital resolution (16,384 steps).

When all dimmers are set for the linear curve, the PWM frequency is 92Hz. This low frequency provides greater efficiency than high frequency switching, reducing heating in the output circuitry and allowing larger loads to be used before thermal shutdown occurs. Higher efficiency provides longer battery life – a very important consideration for wireless dimming. Although a quiet but audible filament buzz can sometimes be heard from incandescent lamps modulated at 92Hz, this sound is comparable to what is heard from traditional high-voltage AC fixtures with 50/60Hz chopped-wave dimming.

If any channel is configured for an inverse-square-law (ISL) curve, the PWM frequency is 738Hz. This eliminates visible flicker and strobing with LEDs and ensures there will be no beating with video frame rates. This higher frequency can be audible with incandescent lamps, and is intended only for use with LEDs and other solid-state devices that do not physically vibrate.

Because LEDs have no inherent filament persistence and respond quickly to changes in power level, low resolution dimming (with a small number of steps) results in noticeable jumps in LED brightness, particularly when viewed peripherally.

RC4Magic Series 2 smoothing is provided with the slow ISL curve. Smoothing makes use of the high-resolution of RC4Magic dimmers by gliding through in-between steps. Although DMX channels provide a range of only 256 steps (0 – 255), having a higher resolution at the dimmer ensures accuracy at the bottom of the ISL curve where changes in power level are very small.

The slow ISL curve provides a long glide time to emulate the filament persistence of a large incandescent lamp. The fast ISL curve does a simple mathematical translation (linear to ISL) without added smoothing. In general, large LED light sources, including arrays of many emitters, will look more pleasing with slow ISL. Smaller sources will look fine with fast ISL response. Fast ISL should be used if quick blinks and flashes are desired.

Dimmer Curves

When setting dimmer channels and curves, channel level ranges provide the following curves:

Dimmer Curve	**Level Percentage**	**Level Dec (0-255)**	**Level in Hex (0-FF)**
Non-Dim	100% (80% or higher)	255 (205 or higher)	0xFF (0xCD or higher)
Linear (no smoothing)	70% (60% - 79%)	180 (154-204)	0xB4 (0x9A-0xCC)
ISL Fast Smoothing	50% (40% - 59%)	128 (103-153)	0x80 (0x67-0x99)
ISL Slow Smoothing	30% (20% - 30%)	77 (52-102)	0x4D (0x34-0x66)
Channel Ignored	Less than 12%	Less than 32	Less than 0x20

Use **ISL Slow** for large, high-power LED devices to reduce stepping during fades.
Use **ISL Fast** for smaller LED devices, or when fast blinks and flashes are required.

Linear is ideal for incandescent loads, including halogen MR16s and MR11s.

Non-Dim is intended for use with relays, solenoids, air brakes, and other on/off devices. Hysteresis ensures there will be no noise or oscillation, even if the source DMX level is slowly changing or is noisy. The DMX level must rise above 54% (dec 138, hex 0x8A) to turn on. Then, the level must fall below 46% (dec 117, hex 0x75) to turn off.

Optimizing Radio Performance

Under ideal circumstances, the range of RC4Magic Series 2 radios exceeds 300 feet and has been reported to be as far as 700 feet. But ideal circumstances are rare. Our published specification of 200 feet is realistic in most situations.

Range is affected by:

1. The orientation of the antennas (RF Hotspots) relative to each other.
2. The number of obstructions between radios.
3. The density of obstructions between radios.
4. Other activity in the 2.4GHz radio band, including leaky microwave ovens.
5. General electrical interference from ac dimmer racks and other power equipment.

Each piece of the RC4Magic Series 2 system has a radio antenna inside which must not be obstructed with metal or other dense objects. This is why the cases are made of tough ABS plastic – they must be transparent to radio waves. The position of the internal antenna is indicated with red circles on the device label – this is called the RF Hotspot.

For best performance, face all RF Hotspots in the same direction, usually upward.

Often there are numerous obstructions between the transmitter and receivers, or there are several receivers positioned in various locations and orientations around the performance space. In this case, try to aim all the RF Hotspots toward a common reflective surface, like a ceiling or wall. The closer the receiver is to the transmitter, the less important orientation becomes.

The high frequency radio signals used by the RC4Magic system tend to reflect more than penetrate. This means that more of the signal will bounce around a room, rather than radiate through the walls to an adjacent space. This helps improve performance between receivers in a performance space, even when line-of-sight between devices is not possible.

Even so, some of the radio signal does penetrate walls and other objects. Provided the transmitter is not too far away, you can successfully place receivers inside theatrical props and practicals, behind flats, and under risers. In these cases, try to place the transmitter as close as possible to these pieces.

An inexpensive RF spectrum analyzer, like the Metageek WiSpy, can be used to inspect the 2.4Ghz radio band and see how well the RC4Magic signal (and other signals) are getting around your space. WiSpy analyzers are available from RC4Wireless at www.theatrewireless.com, www.metageek.net, and elsewhere.

How do I…

… Select a different ID for a DMXioR3?

You choose between 4 different IDs (ID0, ID1, ID2, or ID3) by holding down a recessed button while powering on the unit. When you see the leds chase, let go of the button. Details are provided earlier in this manual.

… Select a different ID for a DMX2dim or DMX4dim?

This is done by holding down one or more of the recessed pushbuttons while powering up the unit. The DMX2dim can be set to ID0, ID1, or ID3 (no access to ID2). The DMX4dim and DMX4dim-500 provides access to all four IDs. Further details are provided earlier in this manual.

… Combine multiple RC4Magic Series 2 systems for a large project?

You can do this by selecting ID3 on all devices being used together. ID3 is the Public ID, and is the same for all RC4Magic Series 2 units.

Troubleshooting and Frequently Asked Questions

General

What simple actions can I try if I am having performance difficulties with my RC4Magic Series 2 system?

First, turn your DMXio transmitter off and on. This will force it to rescan the 2.4GHz radio band and find a new radio channel. Receivers that are already running will take approximately 10 seconds to respond to the loss of data and find the transmitter on the new channel.

The most common cause of problems with DMX2dim dimmers (and all other wireless dimmers on the market) is weak or dead batteries, or batteries that are too small to reliably operate the radio electronics and the external load. Replace, recharge, or upgrade your batteries to resolve the issue.

Test your batteries and loads by directly connecting them together. If they don't work on their own, or they don't last very long, they will not work any better with the dimmer.

One of my dimmers has stopped responding. The RF Con indicator stays solidly lit. What is wrong?

The dimmer is probably set to the wrong system ID. Check to see which ID your transmitter is set to (the Power Up led sequence tell you this). Then, follow the instructions for setting the same ID on your dimmer (by holding down one or more recessed buttons while powering on the unit). Additional instructions for each of these steps is provided earlier in this manual.

We have received a small number of reports that dimmers changed IDs spontaneously. In most cases, this was traced to either dropping the unit while it was powered, or severe mechanical stress. Any circumstance that causes a button to momentarily depress at the same time power is briefly interrupted could cause an ID change. Hardware design improvements as of January 2010 have largely eliminated these issues. Updates are available for older units.

Radio Performance

How common are radio interference problems?

Not common at all. We give this issue a fair amount of attention because users fear radio problems and are very concerned about them. In fact, RC4Magic radios are among the best available and rarely suffer problems. Their ability to automatically seek out and use unoccupied frequencies virtually eliminates radio related issues, and makes it very easy to overcome them when they do arise.

What is the maximum range of the RC4Magic radio link?

Under ideal circumstances, range exceeds 300 feet. More typically, it is around 200 feet. Depending on your situation, range could be less. See *Optimizing Radio Performance* in this manual for additional information.

Is it possible to extend the range of the RC4Magic radio link?

Range can be improved by reducing obstructions, aiming the RF Hotspots differently, eliminating sources of electrical interference, moving devices away from sources of electrical interference (like dimmer racks and dirty arcing lamp sockets) and trying other RF Channels (by turning the DMXio transmitter off and on, forcing a new scan for the clearest channel).

In particular, substantial improvements can be achieved by placing the transmitter high enough to radiate over people's heads.

It is also possible to use high gain and/or directional external antennas with the DMXio. This requires returning the units to the factory for modifications at additional cost, or purchasing the DMXioR3-HG. Wireless data can be transmitted over very long distances using precisely aimed directional antennas. Contact RC4 Wireless for additional information.

Note that most users do not require the DMXioR3-HG with external antenna; our internal antennas are very efficient, despite being hidden within the device enclosure.

How can I tell if a performance problem is related to radio interference or not?

Watch the LED indicators on the RC4Magic units. See that the RF Con indicator is blinking steadily on the receiver. If it is, then the receiver has found and connected with the transmitter. Now check the receiver RF Data indicator. It should blink and shimmer with DMX activity. If it occasionally drops out or appears dim, then some DMX data packets are getting lost. In this case, try aiming the RF Hotspot differently and/or reducing the distance between the transmitter and receiver. Also, watch the speed of the receiver RSSI led, which indicates the strength of the radio signal. The faster the blink, the better the signal. If it is blinking so rapidly that it looks more like a flicker than a blink, then signal is excellent.

You can also monitor radio activity with external test equipment. The low-cost Wi-Spy spectrum analyzer from www.metageek.net is particularly useful, and is available from RC4 Wireless.

What causes radio interference?

Radio interference is caused by other radio signals on or near the same frequency, and sometimes by harmonics of lower radio frequencies. Sources include other radio devices (including WiFi, Bluetooth, and Zigbee devices) and leaky microwave ovens.

Many radio devices (including WiFi, Bluetooth, and Zigbee) only transmit when they need to. Thus, it is possible that the RC4Magic could find a free channel that is not actually free all the time – intermittent interference could occur when the other device

occasionally transmits. In this case, turn the RC4Magic DMXio transmitter off and on, forcing it to find a new channel. Ideally, turn it on when other devices are transmitting. This ensure that the DMXio will see the signal and avoid that channel.

Very few rf devices are as accommodating as RC4Magic – most are user- or factory-configured for a particular rf channel and stay there. Thus, it is often best to turn on your RC4Magic system last, after all other systems are up and running.

Mounting and Positioning

Can I put an RC4Magic receiver inside a metal prop, practical, or wagon?

If a radio receiver is completely surrounded by metal, particularly grounded metal, it is unlikely to work well. Our product cases are made of tough ABS plastic because it is transparent to radio waves; non-metallic materials should be used whenever possible. When this is not possible, some signal will usually get through openings in metal framework.

Mesh does not pass radio at all frequencies. The spacing of the mesh relative to the radio wavelength determines how much signal will pass through. this is why a carefully engineered glass and mesh window can be used in the door of a microwave oven. If you build a box out of old microwave oven doors and put an RC4Magic device inside, you'll be able to see it but it won't pick up any signal.

If possible, build your set pieces out of fibreglass, wood, and plastic. These materials are more transparent to radio than metal is. Minimize the use of metal. Metal framing is fine, but a non-metallic covering over the frame is preferred.

How critical is RF Hotspot positioning?

At distances under 100 feet, RF hotspot positioning is usually not critical at all. When trying to operate at the greatest possible distances, positioning becomes much more important. Performance is usually best when all Hotspots face up, but there are some cases where it is better to face them towards a clear nearby surface, like the theatre back wall.

In general, a common reflective surface helps the signal propagate. Thus, facing everything up works well indoors in a theatre, but doesn't work as well outdoors.

Dimmer Problems

Following the steps to assign a DMX channel to a dimmer, the dimmer came on the Set button was pressed, but now it doesn't track the channel I have up. It stays on all the time.

This is by far the most common problem encountered when first using an RC4Magic system. There is another DMX channel up, that you don't know about. It's a lower channel than the one you're trying to assign.

For example, house lights might be running on DMX channel 1, but are currently being controlled from elsewhere. You've got the board cleared and all faders down, but the houselights are on. DMX channel 1 is up. Your RC4Magic dimmer has assigned itself to the houselights channel.

Profiles for moving lights can also cause a problem. Some systems will send motor channels to a central position when the console is cleared. This results in some channels being up. You might find your RC4Magic dimmer fades up and down with the first motor axis of your first moving instrument.

If clearing all channels to be true zero is difficult using your main console, generate a DMX signal some other way. There are numerous DMX test instruments on the market that will output a level on a single DMX channel. Once your RC4Magic dimmers are assigned, you can go back to your main system. All the assignments will be remembered by the dimmers until you change them.

One or more dimmers works fine when first turned on, but then turns off. Later it comes back on by itself. It seems to cycle or oscillate this way. Why?

This is the over-temperature or over-current protection stepping in to avoid electronic failure of the dimmer. It means that either (a) the load you are using is too large for the dimmer, or (b) the ambient temperature in the dimmer is too high.

Overloading can occur without blowing the fuse (on dimmers that use a fuse). The maximum device current for the DMX2dim and DMX4dim is 15A, but each individual dimmer can often deliver as much as 10A. If you put a 15A load on one dimmer, the fuse will not blow, but that dimmer will over heat.

When the dimmer overheats, it turns itself off. Then, because it is off, it cools down. When it cools down enough, it comes back on. Of course, it then overheats again. And this cycle continues, on and on.

All dimmers generate heat when operating. In addition, internal voltage regulators produce some heat. If the dimmer pack is sealed in a tight space with very little airflow, the temperature of the entire unit will slowly rise. Eventually, it will thermally shutdown, even if the loads are not too high. In this case, more airflow is required.

One of the dimmers in a pack is occasionally blinking or flickering. The other is fine. Why?

This is most likely caused by loose wiring, faulty or poorly mated connectors, or broken solder joints. If everything outside the dimmer seems fine, take the dimmer apart and check the screw terminals and solder joints on the circuit board – connector pins and solder joints can break under heavy use, particularly after over-tightening.

Some users may choose to remove the original screw terminals and solder 16- or 18-gauge wires directly to the circuit board. Done *neatly and carefully*, this will not void your product warranty.

Both of the dimmers on a DMX2dim occasionally shut off at the same time, and stay off for quite a long time. Why?

The radio receiver is resetting, and then takes 10 seconds or more to reconnect to the DMXio transmitter. This is usually a power-supply or battery problem, but could also be an electrical interference problem, or a DMX fault before the DMXio transmitter.

First, be sure the DMX data source at the DMXio transmitter is operating properly. If DMX input data disappears for more than 1 second, dimmer levels will drop to zero and DMXio receivers will stop outputting data.

Next, confirm that the radio link is reliable:

1. The RF Con indicator on the dimmer should be blinking to indicate it is connected to a transmitter. If this indicator stays solidly on, the unit may be assigned to the wrong system ID.

2. The RSSI led is blinking reasonably fast to indicate adequate rf signal strength.

3. The Data indicator is blinking and shimmering with DMX data.

Finally, be sure the battery is in good condition, is fully charged (if rechargeable), and is large enough to power the connected load. Measure the battery voltage with a volt-meter while you bring up the dimmer channels. If the voltage drops substantially under load, the battery is inadequate for the task at hand.

Connect your load devices directly to your battery. If this doesn't work, or the battery dies out quickly, it will not work any better with a dimmer.

RC4*Magic Series 2 Specifications*

RC4Magic RF Technology

Indoor/Urban Range:	Up to 300' (100 m), 200' (66 m) typical
Outdoor Line-of-Sight Range:	Up to 1 mile (1.6 km)
Transmit Power Output:	Up to 100 mW (20 dBm) EIRP [1]
Receiver Sensitivity:	-100dBm
Operating Frequency:	2.4 GHz ISM band
Agency Approvals:	United States FCC OUR-XBEEPRO
	Canada IC 4214A XBEEPRO
	Europe CE ETSI [1]
	Japan 005NYCA0378 [1]

[1] RC4Magic radio modules must be configured for 10dBm output in Europe, Japan and some other jurisdictions. Output power is configurable using the recessed **Set RF pwr** button.

RC4Magic DMX Protocol Compliance

DMX inputs and outputs comply with USITT DMX512/1990(4us).
Packets with non-zero start codes are not transmitted; RC4Magic cannot transfer proprietary data or RDM packets.
DMXio receiver output closely mimics DMXio transmitter input, providing the same number of DMX channels and the same number of packets per second (pps).

Minimum number of DMX channels per packet:	1
Maximum number of DMX channels per packet:	512
Maximum packet-per-second rate:	44pps with 512 channels, 10000pps with 1 channel

DMXioR3

RF Specifications as indicated above. Hidden internal antenna (external high-gain antenna option available).

Dimensions:	3.4" x 2.2" x 1.6" nominal
	(approx. 86mm x 56mm x 40mm)
Power Input:	6VDC – 18VDC, 300mA (from a battery or power adaptor)
	standard 2.1mm power receptacle, center positive
	a power adaptor is provided with each DMXio unit

Transmitter Mode

Only 1 DMXio transmitter should be operated on each system ID.
4 selectable RF output power levels.
4 selectable DMX channel ranges (default is ALL channels).

DMX Input:	meets USITT DMX512/1990(4us)
	with 1-second data hold after data dropout
	NO INTERNAL DMX TERMINATION
DMX Output:	straight-thru hardware connection
	from DMX input to output

Receiver Mode

Any number of DMXio receivers may be used in a system.

DMX Output:	meets USITT DMX512/1990, closely mimics DMX data coming into the associated DMXio transmitter, providing the same number of DMX channels with the same number of packets per second straight-thru hardware connection from DMX input to output (output signal is present on both DMX connectors)

DMX2dimR3 Receiver-Dimmer

RF Specifications as indicated above. Hidden internal antenna.
Any number of DMX2dim receiver-dimmers may be used in a system.

Dimensions:	2.4" x 1.4" x 0.8" nominal (approx. 61mm x 36mm x 20mm)
Power Input:	6VDC – 24VDC (12V typical), 70mA minimum, screw terminal connections
Dimmer Outputs:	2 individual dimmer channels, each with assignable DMX channel and dimmer curve, screw terminal connections
Dimmer Technology:	MOSFET PWM (pulse-width-modulation) pwm resolution 14-bit (16,384 steps) pwm frequency, linear curve: 92Hz pwm frequency, ISL curve: 738Hz (will not beat with video frame rates) maximum output power per dimmer 10A maximum total device output power 15A
Circuit Protection:	each dimmer output is individually protected against over-current and over-temperature

DMX4dim Receiver-Dimmer

RF Specifications as indicated above. Hidden internal antenna.
Any number of DMX4dim receiver-dimmers may be used in a system.

Dimensions:	3.15" x 1.55" x 0.8" nominal (approx. 80mm x 40mm x 20mm)
Power Input:	6VDC – 18VDC (12V typical), 70mA minimum, screw terminal connections
Dimmer Outputs:	4 individual dimmer channels, each with assignable DMX channel and dimmer curve, screw terminal connections
Dimmer Technology:	MOSFET PWM (pulse-width-modulation) pwm resolution 14-bit (16,384 steps) pwm frequency, linear curve: 92Hz pwm frequency, ISL curves: 738Hz (will not beat with video frame rates) maximum output power per dimmer 10A maximum total device output power 15A
Circuit Protection:	each dimmer output is individually protected against over-current and over-temperature

User changeable Bussmann ATC load fuse should not exceed 15A and should be fast-blow type.

DMX4dim-500 Receiver-Dimmer

RF Specifications as indicated above. Hidden internal antenna.
Any number of DMX4dim-500 receiver-dimmers may be used in a system.

Dimensions:	4.5" x 2.5" x 1.25" nominal (approx. 115mm x 64mm x 32mm)
Power Input: 85mA minimum,	6VDC – 30VDC (12V or 24V typical), screw terminal connections
Dimmer Outputs:	4 individual dimmer channels, each with assignable DMX channel and dimmer curve, screw terminal connections
Dimmer Technology:	MOSFET PWM (pulse-width-modulation) pwm resolution 14-bit (16,384 steps) pwm frequency, linear curve: 92Hz pwm frequency, ISL curves: 738Hz (will not beat with video frame rates) maximum output power per dimmer 12A maximum total device output power 42A
Circuit Protection:	each dimmer output is individually protected against over-current and over-temperature

User changeable internal Bussmann ATC load fuse should not exceed 40A and should be fast-blow type.

RC4Magic Series 2 technical specifications are subject to change without notice.

Warranty Policy

Seven-Day Easy Return

You may return any RC4 Wireless Products delivered to you new within the last seven days for a refund, *excluding custom engineered and/or custom manufactured items*. We regret that we cannot refund the shipping charges, or pay for shipping the item back to us. We will not hassle you with mountains of paperwork, but we do require that items be returned *unused in the original packaging*.

Thirty-Day Replacement or Fast-Turn Service Guarantee

If RC4 Wireless technology delivered new to you within the previous thirty days fails to perform to published specifications while being used for its intended application, we will ship a replacement unit to you and arrange for return of your original unit. You will usually have a functioning unit within two business days (including Saturday where delivery services are available) at no charge to you. If a replacement unit is not in stock, we will service your unit in our shop with 48 hour turnaround.

One Year Parts and Labor General Guarantee

If RC4 Wireless technology you have received during the last twelve months fails to perform to published specifications while being used for its intended application, we will service it in our own shop with no charge to you for parts or labor. You pay the shipping to return the unit to us. We pay the shipping to send it back to you fully repaired. Service work is guaranteed for thirty days, during which our fast-turn policy applies.

Out of Warranty Service Policy

If your RC4 Wireless technology requires servicing after the first year, our regular shop rate will apply and parts will be billed at nominal costs. You pay the shipping charges both ways. Service work is guaranteed for thirty days, during which our fast-turn policy applies.

Disclaimers We Must Make

All repair periods are subject to parts availability, and do not apply to holidays or our corporate vacation times (usually the last two weeks of August, subject to change without notice). For critical projects, we recommend purchasing spare equipment. You cannot use our equipment in a show, then return it for a refund: our warranty is not a free rental program. The above warranty policies will not apply if equipment has been abused, misused, or mishandled. We will not be responsible for physical damage, failures caused by incorrect wiring, electrical overloading and/or over-voltage, overheating caused by insufficient ventilation, or damage caused by insufficient packaging during return shipping. We will not be responsible for consequential damages to other equipment, or for lost revenues. We do not guarantee our equipment to be suitable for applications other than those discussed in our application notes and brochures. In particular, no RC4 products should ever be used to control pyro devices. Published power output ratings of some items are accurate only at specific voltages, duty-cycles, and operating temperatures. Some items may require additional cooling and/or protection circuitry to operate reliably with certain loads. Call RC4 Wireless for advice if you are unsure about any operating characteristics.

If your account payments are not up to date, we reserve the right to withhold service until payment is received.

RC4 Wireless pricing, warranty terms, and technical specifications are subject to change without notice.

We want you to be a happy and satisfied customer. Please help us serve you better by letting us know exactly what you need. Thank You!

How to Reach RC4 Wireless

Physical Address

RC4 Wireless is a registered trade-name of Soundsculpture Incorporated

Soundsculpture Incorporated / RC4 Wireless
88 St. George St.
(Near Islington & Evans)
Etobicoke ON
Canada M8Z 3Y7

Telephone / Fax

Toll Free 1-866-258-4577 (North America only)
Toronto 416-259-8499
London, UK +44 (0)20 3289 8765
Emergency Cellular 416-720-5802
Toll Free Fax 1-866-237-6641 (North America only)

Internet

Email techsupport@theatrewireless.com
Skype theatrewireless
Website www.theatrewireless.com

RC4*Magic*

Series 2 R3

Wireless DMX and Wireless Dimming System

R3 User Manual v1.0 Jan-2011

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